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AMERICAN WOOD-PRESERVERS' ASSOCIATION STANDARD

(This Standard is under the jurisdiction of AWPA Subcommittee P-4)

P5–91

STANDARDS FOR WATERBORNE PRESERVATIVES

Note: Standard P5–90 consists of four pages dated as follows: Pgs. 1–4, 1990

Scope

These standards cover waterborne preservative formulations expressed on the oxide basis and prescribe maximum and minimum values of acceptability in either solid, paste, or solution formulations for use in the preservative treatment of wood.

1. ACID COPPER CHROMATE (ACC)

1.1 Acid copper chromate shall have the following composition:

Copper, as CuO	31.8%
Hexavalent chromium, as CrO_3	68.2%

subject to the following tolerances:

1.2 The analytical composition of the solid, paste, liquid concentrate or treating solution forms of the preservative may vary within the following limits:

	Min.[b]
Copper, as CuO	28.0%
Hexavalent chromium, as CrO_3	63.3%

1.3 The solid, paste, liquid concentrate or treating solution shall be made up of water soluble compounds selected from the following groups each in excess of 95 percent purity on an anhydrous basis:

Bivalent copper—e.g., copper sulfate
Hexavalent chromium—e.g., sodium or potassium dichromate, chromium trioxide

The commercial preservative shall be labeled as to its total content of active ingredients listed in the first paragraph.

1.4 Tests to establish conformity with the foregoing requirements shall be made in accordance with the standard methods of the American Wood-Preservers' Association.[c] (See Standard A2.)

[b] The composition of treating solutions in use may deviate outside the limits specified in paragraphs 1.2, 2.2, 3.2, 4.2, 5.2, 6.2 and 7.2 provided: a. The preservative retention in treated material is determined by assay and the retention so determined conforms to the requirements specified in the Table of para. 3.1 in Standard C1. b. Immediate action is taken to adjust the composition of the treating solution.

[c] Acetic acid may be used if desired to adjust pH of treating solution to conform to paragraph 1.4.

2. AMMONIACAL COPPER ARSENATE (ACA)

2.1 Ammoniacal copper arsenate shall have the following composition:

Copper, as CuO	49.8%
Arsenic, as As_2O_5	50.2%

subject to the tolerances listed in paragraph 2.2.

The above shall be dissolved in a solution of ammonia (NH_3) in water. The weight of ammonia contained in a treating solution shall be a minimum of 1.5 times the weight of copper expressed on the oxide basis. To aid in solution, not over 1.7 percent of glacial acetic acid may be added.

2.2 The analytical composition of the solid, paste, liquid concentrate or treating solution forms of the preservative may vary within the following limits:

	Min.[b]
Copper, as CuO	47.7%
Arsenic, as As_2O_5	47.6%

2.3 The treating solution shall contain bivalent copper and pentavalent arsenic derived from compounds in excess of 95 percent purity on an anhydrous basis.

The commercial preservative shall be labeled as to its total content of active ingredients listed in the first paragraph.

2.4 Tests to establish conformity with the foregoing requirements shall be made in accordance with the standard methods of the American Wood-Preservers' Association. (See Standard A2.)

2.5 The valency state of the arsenic component of ACA treating solutions shall be determined in accordance with Section 13 of AWPA Standard A2, to ensure that the arsenic is in the pentavalent form.

3. AMMONIACAL COPPER ZINC ARSENATE (ACZA) .

3.1 Ammoniacal Copper Zinc Arsenate shall have the following composition:

Copper as CuO	50.0%
Zinc as ZnO	25.0%
Arsenic as As_2O_5	25.0%

Subject to the tolerances listed in Paragraph 3.2.

The above shall be dissolved in a solution of ammonia (NH_3) in water. The weight of ammonia

contained in a treating solution and obtained from ammonium hydroxide, shall be at least 1.38 times the weight of copper oxide. To aid in solution, it is also necessary that the treating solution contain ammonium bicarbonate (NH_4HCO_3) at least equal to 0.92 times the weight of copper oxide.

3.2 The composition of the preservative present in a treating solution may vary within the following limits:

	Min. %[b]	Max. %[b]
Copper as CuO	45.0	55.0
Zinc as ZnO	22.5	27.5
Arsenic as As_2O_5	22.5	27.5

3.3 The treating solution shall contain bivalent copper, bivalent zinc and pentavalent arsenic derived from compounds in excess of 95 percent purity on an anhydrous basis.

The commercial preservative shall be labeled as to its total content of active ingredients listed in Paragraph 3.1.

3.4 Tests to establish conformity with the foregoing requirements shall be made in accordance with the standard methods of the American Wood-Preservers' Association.

3.5 The valency state of the arsenic component of ACZA treating solutions shall be determined in accordance with Section 13 of AWPA Standard A2, to ensure that the arsenic is in the pentavalent form.

CHROMATED COPPER ARSENATE

4. TYPE A

4.1 Chromated copper arsenate, Type A, shall have the following composition:

Hexavalent chromium, as CrO_3	65.5%
Copper, as CuO	18.1%
Arsenic, as As_2O_5	16.4%

subject to the following tolerances:

4.2 The analytical composition of the solid, paste, liquid concentrate or treating solution forms of the preservative may vary within the following limits:

	Min., %	Max., %[b]
Hexavalent chromium, as CrO_3	59.4	69.3
Copper, as CuO	16.0	20.9
Arsenic, as As_2O_5	14.7	19.7

[b] The composition of treating solutions in use may deviate outside the limits specified in paragraphs 1.2, 2.2, 3.2, 4.2, 5.2, 6.2 and 7.2 provided: a. The preservative retention in treated material is determined by assay and the retention so determined conforms to the requirements specified in the Table of para. 3.1 in Standard C1. b. Immediate action is taken to adjust the composition of the treating solution.

4.3 The solid, paste, liquid concentrate or treating solution shall be made up of water soluble compounds selected from the following groups each in excess of 95 percent purity on an anhydrous basis:

Hexavalent chromium—e.g., potassium or sodium dichromate, chromium trioxide

Bivalent copper—e.g., copper sulfate, basic copper carbonate, cupric oxide or hydroxide

Pentavalent arsenic—e.g., arsenic pentoxide, arsenic acid, sodium arsenate or pyroarsenate

Certain impurities, such as iron, lead, chloride, organic matter and insolubles, may result in the formation of sludge in CCA concentrates and/or treating solutions. Caution is advised in selecting raw materials and evaluating treating solutions. For details of these effects reference Proceedings AWPA 82:28.

The commercial preservative shall be labeled as to its total content of active ingredients listed in the first paragraph.

4.4 Tests to establish conformity with the foregoing requirements shall be made in accordance with the standard methods of the American Wood-Preservers' Association. (See Standard A2.)

5. TYPE B

5.1 Chromated copper arsenate, Type B, shall have the following composition:

Hexavalent chromium, as CrO_3	35.3%
Copper, as CuO	19.6%
Arsenic, as As_2O_5	45.1%

subject to the following tolerances:

5.2 The analytical composition of the solid, paste, liquid concentrate or treating solution forms of the preservative may vary within the following limits:

	Min., %	Max., %[b]
Hexavalent chromium, as CrO_3	33.0	38.0
Copper, as CuO	18.0	22.0
Arsenic, as As_2O_5	42.0	48.0

5.3 The solid, paste, liquid concentrate or treating solution shall be made up of water soluble compounds selected from the following groups each in excess of 95 percent purity on an anhydrous basis:

Hexavalent chromium—e.g., potassium or sodium dichromate, chromium trioxide

Bivalent copper—e.g., copper sulfate, basic copper carbonate, cupric oxide or hydroxide

Pentavalent arsenic—e.g., arsenic pentoxide, arsenic acid, sodium arsenate or pyroarsenate

Certain impurities, such as iron, lead, chloride, organic matter and insolubles, may result in the formation of sludge in CCA concentrates and/or treating solutions. Caution is advised in selecting raw materials and evaluating treating solutions. For details of these effects reference Proceedings AWPA 82:28.

The commercial preservative shall be labeled as to its total content of active ingredients listed in the first paragraph.

5.4 Tests to establish conformity with the foregoing requirements shall be made in accordance with the standard methods of the American Wood-Preservers' Association. (See Standard A2.)

6. TYPE C

6.1 The active ingredients in chromated copper arsenate shall have the following composition:

Hexavalent chromium, as CrO_3	47.5%
Copper, as CuO	18.5%
Arsenic, as As_2O_5	34.0%

6.2 The analytical composition of the solid, paste, liquid concentrate or treating solution forms of the preservative may vary within the following limits:

	Min., %	Max., %[b]
Hexavalent chromium, as CrO_3	44.5	50.5
Copper, as CuO	17.0	21.0
Arsenic, as As_2O_5	30.0	38.0

6.3 The solid, paste, liquid concentrate or treating solution shall be made up of water soluble compounds selected from the following groups each in excess of 95 percent purity on an anhydrous basis:

Hexavalent chromium—e.g., potassium or sodium dichromate, chromium trioxide
Bivalent copper—e.g., copper sulfate, basic copper carbonate, cupric oxide or hydroxide
Pentavalent arsenic—e.g., arsenic pentoxide, arsenic acid, sodium arsenate or pyroarsenate

Certain impurities, such as iron, lead, chloride, organic matter and insolubles, may result in the formation of sludge in CCA concentrates and/or treating solutions. Caution is advised in selecting raw materials and evaluating treating solutions. For details of these effects reference Proceedings AWPA 82:28.

The commercial preservative shall be labeled as to its total content of active ingredients listed in the first paragraph.

6.4 Tests to establish conformity with the foregoing requirements shall be made in accordance with the standard methods of the American Wood-Preservers' Association. (See Standard A2.)

7. CHROMATED ZINC CHLORIDE (CZC)

7.1 Chromated zinc chloride shall have the following composition:

Hexavalent chromium, as CrO_3	20%
Zinc, as ZnO	80%

subject to the following tolerances:

7.2 The analytical composition of the solid, paste, liquid concentrate or treating solution forms of the preservative may vary within the following limits:

	Min., %[b]
Hexavalent chromium, as CrO_3	19
Zinc, as ZnO	76

[b] The composition of treating solutions in use may deviate outside the limits specified in paragraphs 1.2, 2.2, 3.2, 4.2, 5.2, 6.2 and 7.2 provided: a. The preservative retention in treated material is determined by assay and the retention so determined conforms to the requirements specified in the Table of para. 3.1 in Standard C1. b. Immediate action is taken to adjust the composition of the treating solution.

7.3 Samples of chromated zinc chloride treating solution taken from a working tank or treating cylinder may show changes in composition as a result of treating operations. Such changes shall not serve to cause rejection of the preservative if they do not raise the ratio of zinc oxide to chromium trioxide to more than 7 to 1, and if it can be shown that the original fresh preservative was of the specified composition.

7.4 The solid, paste, liquid concentrate or treating solution shall be made up of water soluble compounds selected from the following groups each in excess of 95 percent purity on an anhydrous basis:

Hexavalent chromium—e.g., sodium dichromate, chromium trioxide
Zinc—e.g., zinc chloride

The commercial preservative shall be labeled as to its total content of active ingredients listed in the first paragraph.

7.5 Tests to establish conformity with the foregoing requirements shall be made in accordance with the standard methods of the American Wood-Preservers' Association. (See Standard A2.)

8. ALKYL AMMONIUM COMPOUND (AAC)

8.1 Aklyl ammonium compound shall have the following composition:

Didecyldimethylammonium chloride	90% min.
Dialkyldimethylammonium chlorides (containing C8 or C12)	10% max.

8.2 The liquid concentrate shall be made up in lower (< C4) alcohols and/or water such that the active ingredient is freely soluble in water.

The commercial preservative shall be labeled as to its total content of active ingredients listed in the first paragraph.

9. INORGANIC BORON

9.1 Borate oxide (SBX)

9.2 Boron as B_2O_3

9.3 The solid or treating solutions shall be made up of sufficient water soluble compounds, each in excess of 98% purity on an anhydrous basis. Acceptable borate salts are sodium octaborate, sodium tetraborate, and sodium pentaborate.

9.4 The commercial preservative shall be labeled as to its total content of active ingredients listed in the second paragraph.

Tests to establish conformity with the foregoing requirements shall be made in accordance with the standard methods of the American Wood-Preservers' Association. (See Standard A2.)

10. pH OF TREATING SOLUTIONS

10.1 The pH of waterborne preservative solutions shall be within the following limits:

Preservative	*pH Limits*
ACC	3.0–7.0
ACA	Not Applicable
ACC	2.0–3.9
ACZA	Not applicable
CCA-Type A	1.6–2.7
CCA-Type B	1.6–2.5
CCA-Type C	1.6–2.5
CZC	2.8–4.0
SBX	7.9–9.0

10.2 These pH values are preferably measured at an oxide concentration in the treating solution of 15–22 g./l. and at a temperature of 20–30°C. If a CCA treating solution has a pH outside the stated limits and can be shown that it can be made conforming by the addition of CCA concentrate or chromic acid while remaining within the recommended limits stated in Standard P-5, Sections 4.2, 5.2 and 6.2, the solution shall be considered conforming to the standard.

11. STANDARD ADDITIVES.

The CCA/oil emulsion formulation is recognized as a standard additive system for CCA, per the 1991 Report of Subcommittee P-4.